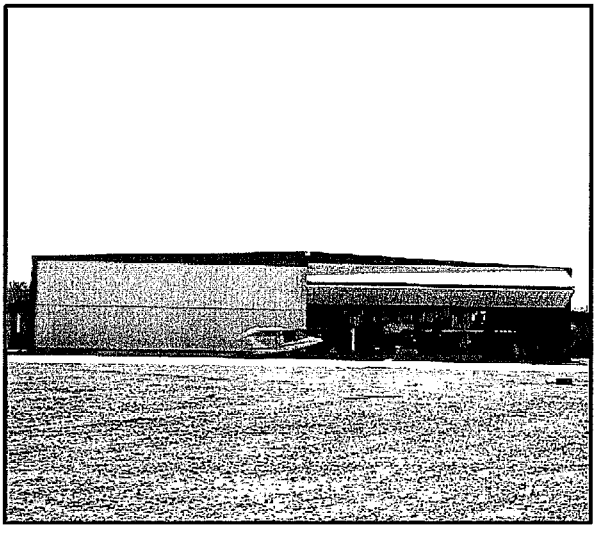
Chapter Three
FACILITY REQUIREMENTS

Chapter Three

FACILITY REQUIREMENTS



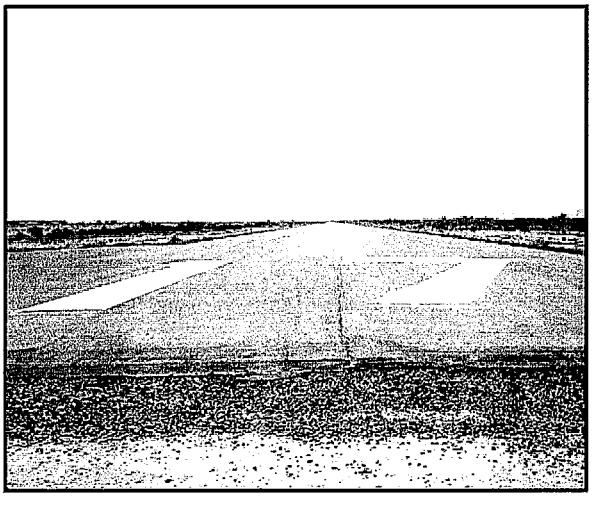
To properly plan for the future of Buckeye Municipal Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as establishing planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting), and landside (i.e., hangars, terminal building, aircraft parking apron, fueling, automobile parking and access) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities, outline what new facilities may be needed, and when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in **Chapter Four** to determine the most cost-effective and efficient means for implementation.

AIRFIELD CAPACITY

Analysis of airfield capacity and delay was examined for this master plan utilizing FAA Advisory Circular (AC) 150/5060-5, **Airport Capacity and Delay**. The methodology presented in this advisory circular and utilized here produces statements of airfield capacity in the major terms:

Hourly Capacity of Runways: The maximum number of aircraft operations that can take place in one hour.



Weighted Hourly Capacity: Average of hourly capacities for various runway use scenarios weighted according to percentage of use.

Annual Service Volume: The annual capacity or a maximum level of aircraft operations that may be used as a reference in planning the runway system.

Annual Aircraft Delay: Total delay incurred by all aircraft on the airfield in one year.

The capacity of an airport is affected by several factors including airfield layout, meteorological conditions, runway use, aircraft mix, percent arrivals, percent touch-and-go's, and exit taxiway locations. These factors are described in the following paragraphs.

- **Airfield layout** refers to the location and orientation of the runways, taxiways, and terminal area. **Exhibit 1B** depicted the existing layout of Buckeye Municipal Airport which is served by a single runway (17-35) measuring 4,300 feet long by 75 feet wide. Strength-rated at 12,500 pounds single gear wheel loading (SWL), this runway is designed primarily for general aviation operations.

- **Meteorological conditions** analysis considers weather conditions as they affect runway utilization, orientation, and aircraft separation requirements. With the desert climate, Buckeye Municipal Airport operates under VFR conditions over 98 percent of the time. Because IFR and PVC conditions occur less than two percent of the time, the effect on capacity can be ignored and calculations of airfield capacity are based solely on VFR conditions.

- **Runway use** refers to the percentage of time each runway configuration is utilized. Since there is only one runway at Buckeye Municipal Airport, the direction of take-offs and landings is often determined by the direction of the prevailing winds. Weather data collected from the area indicates that winds are generally from the south-southwest, thus, Runway 17 is utilized a higher percentage of the time.

- **Aircraft mix** for the capacity analysis is defined in terms of the four aircraft classes. The aircraft mix at Buckeye Municipal Airport currently includes two of the four classes. Classes A and B consist of small and medium-sized propeller aircraft and some jets, all weighing 12,500 pounds or less. These aircraft are associated primarily with general aviation activity, but do include some air taxi and commuter aircraft. Future aircraft mix will include a small percentage of Class C aircraft which consists of aircraft weighing between 12,500 pounds and 300,000 pounds. These aircraft are associated primarily with airline activity, but do include most business jets as well as larger general aviation and commuter propeller aircraft.

- **Percent arrivals** as they relate to the total operations of the airport is important in determining capacity. Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. Except in unique circumstances, the aircraft arrival-departure split is typically 50-50. At Buckeye Municipal Airport, traffic information indicated no significant deviation from this pattern, and arrivals were estimated to account for 50 percent of design period operations.

- **Percent touch-and-go** analyzes the percentage of total aircraft operations that are training operations. A touch-and-go operation is normally associated with general aviation training and involves an aircraft making a landing and an immediate take-off without coming to a full stop or exiting the runway. A high percentage of touch-and-go traffic normally results in a slightly higher operational capacity. At Buckeye Municipal Airport, touch-and-go operations currently account for 70 to 75 percent of annual operations. Operationally, Buckeye Municipal Airport is likely to remain primarily a training facility. Therefore, this percentage is expected to remain relatively stable in the short term, then decrease slightly over the remainder of the planning period as business aircraft usage increases.

- **Exit taxiways** have a significant effect on airfield capacity since their locations directly determine the occupancy time of an aircraft on the runway. As stated previously, Runway 17-35 has a total of five exit taxiways which can be used for aircraft operations. The capacity analysis gives credit to exits located within a prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runway. Under this criteria, the exit range for Runway 17-35 is 2,000 to 4,000 feet. The exits must be at least 750 feet apart to be credited as separate exits. Runway 17-35 can be credited for two exits in each direction.

CAPACITY ANALYSIS

The preceding information was used in conjunction with the airside capacity methodology developed by the FAA to determine airfield capacity for Buckeye Municipal Airport.

Hourly Runway Capacity

The first step in the analysis involved the computation of the runway hourly capacity. Wind direction, the percentage of IFR and PVC weather, and the number and locations of runway exits then become important factors in determining the weighted hourly capacity.

Considering the existing runway system, the existing and forecast aircraft mix, a touch-and-go factor of 70 percent, and the taxiway exit rating of the existing runway, the hourly capacity was computed. The existing maximum

hourly capacity totaled 137 operations per hour.

As previously discussed, the percentage of Class C aircraft is forecast to increase from zero to three percent for the airport over the long range planning horizon. This factor contributes to a decline in the hourly capacity of the runway system. In the long range, the maximum hourly capacity of the current runway system will decline to 132 operations. The capacity of the airfield will not be exceeded by design hour demand within the planning period.

The weighted hourly capacity averages the hourly capacities of the runway in VFR, IFR, and PVC conditions. At Buckeye Municipal Airport, the weighted runway capacity is equal to the hourly capacity because IFR and PVC conditions occur an insignificant percentage of the time.

Annual Service Volume

Once the weighted hourly capacity is known, the annual service volume (ASV) can be determined. ASV is calculated by the following equation:

$$ASV = C \times D \times H$$

The current weighted hourly capacity (C) of the runway component was currently estimated at 137 operations. The current ratio of annual demand to average daily demand (D) was estimated to be 300. This is expected to remain at 300 for the long range planning period. The ratio of average daily demand to average peak hour demand (H) was estimated to be 5.0 in 1995. As operations increase, the percentage of daily operations is expected to remain relatively constant because operations will spread out throughout the day.

The current ASV for Buckeye Municipal Airport was determined to be 205,500 operations. As mentioned earlier, the percentage of Class C aircraft utilizing the airport is expected to increase to three percent. As a result, the ASV will decrease to 198,000 operations for the long range planning horizon. With operations in 1995 totaling 84,600, the airport is currently at 41.2 percent of its annual service volume. Long range annual operations are forecast to reach 140,000 operations which would equal 70.7 percent of the airport's ASV. Also, if ATC begins utilizing the airport for touch-and-go training once again, the airport's ASV will fall below 140,000 and could increase operational delays. It should be noted that the ASV was determined utilizing operational estimates provided on FAA's Form 5010 and from discussions with airport businesses and users. Although the operational figures are only estimates, they represent the best source of data available. Thus, for planning purposes, the ASV calculations will serve to identify operational conditions which may bring about a need to increase the capacity of the runway system in the future.

Annual Delay

As an airport approaches capacity, it begins to experience increasing amounts

of delay to aircraft operations. Delays occur to arriving and departing aircraft during both VFR and IFR conditions. Arriving aircraft delays result in aircraft holding in the airport traffic pattern or waiting. Departing aircraft delays result in aircraft holding on the taxiway or apron until safety allows for the aircraft to depart.

As an airport's operations increase, delay increases exponentially. Because Buckeye Municipal Airport is primarily utilized as a training facility and weather conditions play an insignificant role in aircraft delay, annual delay at Buckeye Municipal Airport is currently estimated at 423 hours. Analysis of delay factors for the long range planning horizon indicate that annual delay can be expected to reach 1,400 hours.

CONCLUSIONS

From the analysis, it was determined that annual operations at Buckeye Municipal Airport are anticipated to reach approximately 71 percent of the airport's ASV in the long range of the planning period. FAA Order 5090.3B, **Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)**, indicates that improvements to capacity should be planned once operations reach 60 percent of the airport's ASV. Furthermore, it is recommended that improvements to airfield capacity be made once operations reach 80 percent of an airport's ASV. Capacity enhancements to the airfield will be analyzed further in the following chapter - **Airport Development Alternatives.**

In addition to the basic capacity requirements, several other facility components must be examined to ensure that the airport is properly planned to meet the future needs. The following sections will outline the facility needs associated with future demand. That information, combined with this capacity analysis, will provide the background for examining various alternatives to meet future aviation needs of the Buckeye area.

AIRFIELD REQUIREMENTS

Airfield requirements include the needs for those facilities related to the arrival and departure of aircraft. These facilities are comprised of the following items:

- Runways
- Taxiways
- Navigational Aids
- Airfield Marking and Lighting

The selection of the appropriate FAA design standards for the development of the airfield facilities is based primarily upon the characteristics of the aircraft which are expected to use the airport. The most critical characteristics are the **approach speed** and the size of the **critical design aircraft** anticipated to use the airport now or in the future. The critical design aircraft is defined as the most demanding category of aircraft which makes 500 or more operations per year. Planning for future aircraft

use is of particular importance since design standards are used to plan separation distances between facilities. These standards must be determined now since the relocation of these facilities will likely be extremely expensive at a later date.

The Federal Aviation Administration has established criteria for use in the sizing and design of airfield facilities. These standards include criteria which relate to aircraft size and performance. According to Federal Aviation Administration Advisory Circular (AC) 150/5300-13, **Airport Design**, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speeds of less than 91 knots.

Category B: Speeds of 91 knots or more, but less than 121 knots.

Category C: Speeds of 121 knots or more, but less than 141 knots.

Category D: Speeds of 141 knots or more, but less than 166 knots.

Category E: Speeds of 166 knots or greater.

The second basic design criteria relates to aircraft size. The Airplane Design Group (**ADG**) is based upon wingspan. The six groups are as follows:

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet or greater.

Together, approach category and ADG identify a coding system whereby Airport design criteria are related to the operational and physical characteristics of the aircraft intended to operate at the airport. This code, the **Airport Reference Code** (ARC), has two components: the first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways and taxilanes. **Table 3A** provides a listing of typical aircraft which meet the critical aircraft criteria as the most current and anticipated users.

TABLE 3A
Typical Aircraft Classifications
Buckeye Municipal Airport

Typical Aircraft	Approach Speed (knots)	Wingspan (feet)	Airport Reference Code	Maximum Take-off Weight (lbs.)
Single-Engine Piston				
Cessna 150	55	32.7	A-I	1,600
Cessna 172	64	35.8	A-I	2,300
Beech Bonanza	75	37.8	A-I	3,850
Twin-Engine Piston				
Beech Baron	101	37.8	B-I	6,200
Cessna 402	95	39.8	B-I	6,300
Piper Navajo	100	40.7	B-I	6,200
Cessna 421	96	41.7	B-I	7,450
Turboprop				
Piper Cheyenne	110	47.7	B-I	12,050
Beech King-Air B100	111	45.8	B-I	11,800
Super KingAir	103	54.5	B-II	12,500
Cessna 441	100	49.3	B-II	9,925
Mitsubishi MU-2	119	39.2	B-I	10,800
Corporate Jets				
Cessna Citation I	108	47.1	B-I	11,850
Cessna Citation II	108	51.7	B-II	13,300
Cessna Citation III	114	53.5	B-II	22,000
Learjet 25	137	35.6	C-I	15,000
Learjet 55	128	43.7	C-I	21,500
Falcon 10	104	42.9	B-I	18,740
Falcon 20	107	53.5	B-II	28,660
BAe 800	125	51.4	C-II	23,350
Westwind	127	44.8	C-I	23,300
Learjet 35	143	39.5	D-I	18,300
Canadair Challenger	125	61.8	C-II	41,250
Falcon 900	100	63.4	B-II	45,500
Gulfstream II	141	68.8	D-II	65,300
Gulfstream III	136	77.8	C-II	68,700
Gulfstream IV	145	77.8	D-II	71,780

FAA advises designing all elements to meet the requirements of the airport's most demanding, or critical aircraft. In order to determine the airport's facility requirements, the ARC of the critical should first be determined, thus enabling the application of appropriate design criteria.

Buckeye Municipal Airport is presently utilized by general aviation aircraft ranging up to ARC B-II. Future aircraft mix will likely include corporate turbo-prop and business jet aircraft. A westward growth of the Phoenix Metropolitan Area and potential development of an on airport industrial park will be the leading contributors to the increase in corporate aircraft activity.

Because it is likely that the airport will be served by corporate aircraft ranging from turboprop to business jets in the future, airport facilities will need to be planned to accommodate these aircraft. Expected corporate aircraft may include Beech Super King Air, Cessna Citation, Learjet, and Gulfstream aircraft. These aircraft range up to ARC D-II. Therefore, airport design standards should consider Approach Category D and Design Group II to satisfy future airport activity.

The airfield facility requirements outlined in this chapter comply with the design standards described in FAA's Advisory Circular 150/5300-13, **Airport Design.** The following airfield facilities are outlined to describe the scope of facilities that would be necessary to accommodate the airport's role throughout the planning period.

RUNWAYS

The adequacy of the existing runway system at Buckeye Municipal Airport has been analyzed from a number of perspectives, including runway orientation, airfield capacity, runway length, and pavement strength. From this information, requirements for runway improvements were determined for the airport.

Runway Orientation

Runway 17-35 is 4,300 feet long, oriented in a north-south direction. Ideally the primary runway at an airport should be oriented as close as practical in the direction of the predominant winds to maximize the runway's usage. This minimizes the percent of time that a crosswind could make the preferred runway inoperable.

FAA Advisory Circular 150/5300-13, Change 1, **Airport Design** recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for Airport Reference Codes (ARC) A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; and 16 knots (18 mph) for ARC C-I through D-II.

Construction of the Palo Verde Nuclear Generating Station, approximately five miles southwest of the Airport, required

collection of wind data between 1973 and 1980. Also, wind data was conducted at Buckeye Municipal Airport between May and December 1981. This data was utilized in the previous master plan and is graphically depicted by the wind rose in **Exhibit 3A**. Runway 17-35 provides 96.1 percent coverage for 10.5 knot crosswinds and 98.1 percent at 13 knots. Thus, Runway 17-35 provides adequate wind coverage for all aircraft.

Runway Length

The determination of runway length requirements for the airport are based on five primary factors:

- Critical aircraft type expected to use the airport.
- Stage length of the longest nonstop trip destinations.
- Mean maximum daily temperature of the hottest month.
- Runway gradient.
- Airport elevation.

An analysis of the existing and future fleet mix indicates that business jets will be the most demanding aircraft on runway length at Buckeye Municipal Airport. The typical business aircraft range from the Cessna Citation I, with minimal runway length requirements, to the Citation III and the Lear Jet models 25 and 35, requiring longer runway lengths.

Aircraft operating characteristics are affected by three primary factors. They are the mean maximum temperature of the hottest month, the airport's elevation, and the gradient of the runway. The mean maximum daily temperature of the hottest month for Buckeye Municipal Airport is 107.3 degrees Fahrenheit. The airport elevation is 1,024 feet MSL. Gradient for Runway 17-35 is 0.67 percent.

Table 3B outlines the runway length requirements for various classifications of aircraft that utilize Buckeye Municipal Airport. These standards were derived from the **FAA Airport Design Computer Program** for recommended runway lengths. As with other design criteria, runway length requirements are based upon the critical aircraft grouping with at least 500 annual operations.

Based upon the existing aircraft fleet operating at Buckeye Municipal Airport and the forecasted aircraft fleet projected through the long range planning period, Buckeye Municipal Airport should be designed to accommodate the range of business jets for domestic flights within the continental United States. Currently, the length of Runway 17-35 is 4,300 feet. This length exceeds the requirements for small airplanes with less than ten passenger seats, but falls short of the requirements for small airplanes with ten or more passenger seats and business jets. According to the FAA design program, to fully accommodate 75 percent of these aircraft at 60 percent useful load, the

TABLE 3B
Runway Length Requirements
Buckeye Municipal Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	1,024 feet
Mean daily maximum temperature of the hottest month	107.3 F
Maximum difference in runway centerline elevation	29 feet
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,100 feet
95 percent of these small airplanes	3,700 feet
100 percent of these small airplanes	4,300 feet
Small airplanes with 10 or more passengers seats	4,800 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,500 feet
75 percent of these large airplanes at 90 percent useful load	8,600 feet
100 percent of these large airplanes at 60 percent useful load	7,300 feet
100 percent of these large airplanes at 90 percent useful load	11,300 feet

REFERENCE: Chapter Two of AC 150/5325-4A, **Runway Length Requirements for Airport Design**, no Changes included.

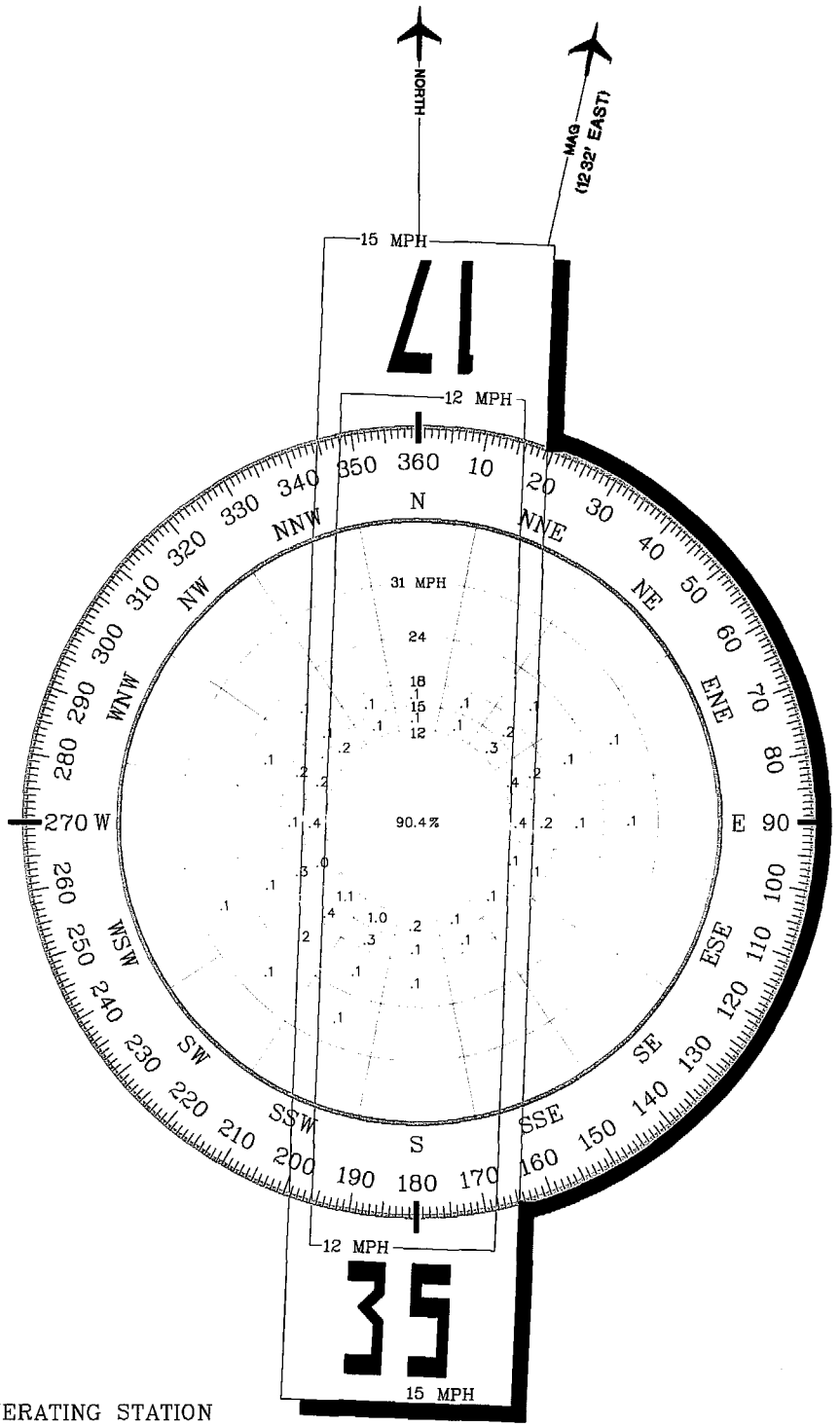
runway length should be 5,500 feet. To accommodate 100 percent of the aircraft at 60 percent useful load, the runway should ultimately be planned for 7,300 feet.

It should be noted that the previous master plan indicated that the runway should ultimately measure 7,700 feet. Analysis of runway length requirements conducted in the previous master plan utilized FAA runway length requirements which have subsequently been revised. Current FAA runway length requirements, as calculated from FAA's design software, indicate a runway measuring 7,300 feet should be planned to accommodate all corporate aircraft (design aircraft) expected to operate at the airport at 60 percent useful load.

Runway Width

Runway 17-35 is currently 75 feet wide. This width is adequate for aircraft in Approach Categories A and B. However, FAA design standards call for a 100-foot width for Approach Category C and D. Therefore, the runway should be planned to be widened to 100 feet once additional runway length is provided to serve aircraft in Approach Category C and D.

96MP02-3A-01/29/97



SOURCE:
PALO VERDE
NUCLEAR GENERATING STATION
(1973–1980)

BUCKEYE MUNICIPAL AIRPORT
(MAY 1981–DECEMBER 1981)

WIND COVERAGE		
	12 MPH	15 MPH
Runway 17–35	*96.1%*	*98.1%*

Exhibit 3A
Windrose

Runway Strength

Runway 17-35 has a pavement strength of 12,500 pounds single-wheel gear loading strength (SWL). This is adequate for aircraft that currently use the airport on a regular basis. However, the largest business jet is the Grumman Gulfstream series II, III, and IV which can weigh over 70,000 pounds on dual wheel gear. The current pavement strength cannot accommodate this aircraft, or many of the smaller business jet aircraft on a frequent or regular basis. If these aircraft begin to use the airport on a regular basis, the pavement should be strengthened to 75,000 pounds DWL.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield.

Runway 17-35 is served by a full length parallel taxiway. The width of the parallel taxiway is 40 feet and will be adequate for the aircraft that are anticipated to operate at Buckeye Municipal Airport over the long range. The runway is also served by five exit taxiways adequately spaced along the runway.

As mentioned earlier, operations by larger corporate type aircraft are forecasted to increase steadily throughout the planning period requiring the runway to ultimately measure 7,300 feet in length. At this time, the parallel taxiway should be extended to mirror the length of the runway. The extension of the parallel taxiway should include the construction of two additional exit taxiways. Also, the existing width of all taxiways is adequate to meet the requirements of Group II aircraft.

NAVIGATIONAL AIDS

Airport and runway navigational aids are based on FAA recommendations as depicted in DOT/FAA Handbook 7031.2B, **Airway Planning Standard Number One** and FAA Advisory Circular 150/5300-2D, **Airport Design Standards, Site Requirements for Terminal Navigation Facilities.**

Navigational aids provide two primary services to airport operations, precision guidance to specific runway and/or non-precision guidance to a runway or the airport itself. The basic difference between a precision and non-precision navigational aid is that the former provides electronic descent, alignment (course), and position guidance, while the non-precision navigational aid provides only alignment and position location information. The necessity of such equipment is usually determined by design standards predicated on safety considerations and operational needs. The type, purpose and volume of aviation activity expected at the airport are factors in the determination of the airport's eligibility for navigational aids.

Global Positional System

The advancement of technology has been one of the most important factors in the growth of the aviation industry in the twentieth century. Much of the civil aviation and aerospace technology has been derived and enhanced from the initial development of technological improvements for military purposes. The use of orbiting satellites to confirm an aircraft's location is the latest military development to be made available to the civil aviation community.

Global positioning systems (GPS) use two or more satellites to derive an aircraft's location by a triangulation method. The accuracy of these systems has been remarkable, with initial degrees of error of only a few meters. As the technology improves, it is anticipated that GPS may be able to provide accurate enough position information to allow Category II and III precision instrument approaches, independent of any existing ground-based navigational facilities. In addition to the navigational benefits, it has been estimated that GPS equipment will be much less costly than existing precision instrument landing systems.

Currently, Buckeye Municipal Airport is not served by an instrument approach. With the evolution of GPS, however, it is likely that Buckeye Municipal Airport will have the opportunity to be served by an instrument approach in the future which would be primarily utilized for training purposes. Therefore, the airport should be planned for GPS approaches.

Because the cost of implementing a Category I (CAT I) GPS approach is much lower than traditional instrument landing system (ILS) equipment, at least one end of the runway should be planned for a CAT I approach. A CAT I approach will allow the runway to remain operational with visibility of one-half mile and cloud ceilings of at least 200 feet. Analysis of area airspace indicates that Runway 35 would be the best choice for a CAT I approach because it would minimize airspace conflicts with Luke Air Force Base.

Visual Approach Aids

Visual glide slope indicators (VGSI) are a system of lights located at the side of the runway which provide visual descent guidance information during an approach to the runway. Both ends of the runway are currently equipped with VGSI systems at Buckeye Municipal Airport. Runway 17-35 is equipped with a two-box precision path indicators (PAPI-2). While two-box systems are adequate for use by propeller aircraft, four-box systems are needed for use by business jet aircraft. Therefore, the PAPI-2 system on Runway 17-35 will ultimately need to be upgraded to a PAPI-4.

AIRFIELD LIGHTING AND MARKING

Runway identification lighting provides the pilot with a rapid and positive

identification of the runway end. The most basic system involves runway end identifier lights (REIL's). REIL's should be considered for all lighted runways not planned for a more sophisticated approach light system (ALS). Thus, Runway 17-35 should be planned for REIL's.

An approach light system should be planned for Runway 35 in order to establish CAT I minimums for the planned GPS approach. A medium intensity approach light system with runway alignment indicator lights (MALSR) would allow the approach to attain the visibility minimums to one-half mile. The medium intensity runway lighting (MIRL) on Runway 17-35 and medium intensity taxiway lighting (MITL) will be adequate for the planning period. Runway marking should be upgraded to nonprecision marking on Runway 17 and upgraded to precision marking on Runway 35.

The airport also presently has a wind cone and segmented circle which provides pilots with information about wind conditions. In addition, an airport beacon assists in identifying the airport from the air at night. The beacon is not presently operational, but plans call for it to be rehabilitated in the near future. Each of the facilities should be improved/maintained in the future.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft, passengers, and cargo while on the ground. These facilities provide the essential interface between the air and ground transportation modes. These areas will be subdivided into two parts: general aviation facilities, and support facilities. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

GENERAL AVIATION FACILITIES

The purpose of this section is to determine the space requirements during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal

Hangars

The space required for hangar facilities is dependent upon the number and type of aircraft expected to be based at the Airport. Based upon an analysis of general aviation facilities and the current demand at Buckeye Municipal Airport, percentages representing hangar requirements for various types of general aviation aircraft have been calculated. The analysis indicates that all based aircraft at the Airport are hangared except for a few single engine aircraft which remain tied down on the apron area. Although most based aircraft are hangared, the aircraft maintenance performed by the FBO requires some aircraft to be moved

outside the hangar to provide adequate room for mechanics to work on aircraft.

Weather conditions at Buckeye Municipal Airport, including blowing dust and extreme heat in the summer, suggest nearly all of the based aircraft owners prefer hangar space to outside tie-downs. Since this is their preference, it is necessary to determine what percentages of these aircraft would utilize conventional-type hangars as opposed to individual T-hangars. T-hangars are less expensive to construct and provide the aircraft owner more privacy and greater ease in obtaining access to the aircraft. The principal uses of conventional hangars at general aviation airports are for large aircraft storage, storage during maintenance, and for housing fixed base operator activities.

From the analysis in **Table 3C**, it appears that adequate conventional hangar storage space could be available for the short term, however, additional conventional hangers are needed in the intermediate term and long range. Also, as existing conventional hangars age, they may need to be replaced. Furthermore, the airport should always have space available to accommodate a corporate hangar as an attraction for new businesses considering relocation to the Buckeye area.

Presently, all of the T-hangar positions on the airfield are occupied and there is a waiting list to obtain space. In fact, a shade hangar facility has recently been enclosed to serve as a T-hangar facility. Analysis of T-hangar space indicates that existing T-hangar facilities provide an area of 930 square feet per individual storage unit, while total T-hangar space available at the airport totals 37,200 square feet. As shown in **Table 3C**, an additional 50 T-hangars will be needed within the scope of the planning period.

The final step in the process of determining hangar requirements involves estimating the area necessary to accommodate the required hangar space. A planning standard of 1,200 square feet per based aircraft stored in T-hangars and 2,500 square feet for turbine aircraft was used. These planning figures were then applied to the aircraft to be hangared in conventional and T-hangars to determine the area to be devoted to hangar facility requirements through the planning period. Also, an area equal to 10 percent of the total hangar space on the airport should be allocated for maintenance shop facilities. It is assumed that this maintenance area would be housed in conventional hangar space. The hangar needs are presented in **Table 3C.**

Aircraft Parking Apron

A parking apron should be provided for at least the number of locally-based aircraft that are not stored in hangars, as well as transient aircraft. At the present time two based aircraft are stored full-time on the ramp, although some aircraft stored in conventional hangars may be moved to the ramp during the day to provide hangar area for aircraft maintenance. In the future, based aircraft are expected to continue to be stored in hangars.

TABLE 3C
Hangar Requirements
Buckeye Municipal Airport

	Existing	Current Need	Short Term	Intermediate Term	Long Range
Based Aircraft					
Single Engine		36	54	69	109
Multi-Engine		2	4	6	12
Turboprops		0	1	2	4
Jets		0	0	1	2
Rotorcraft		0	1	2	3
Total		38	60	80	130
Aircraft to be Hangared					
Single Engine		33	49	64	99
Multi-Engine		2	4	6	12
Turboprops		0	1	2	4
Jets		0	0	1	2
Rotorcraft		0	1	2	3
Total		35	54	75	120
T-Hangar Positions	40	30	50	70	110
Conventional Hangar Positions	10	5	4	5	10
Conventional Hangar Area (s.f.)					
Aircraft Storage	N/A	6,000	5,000	12,500	22,500
Aircraft Maintenance	N/A	4,200	6,500	9,700	15,500
Total	57,000	10,200	11,500	22,200	38,000
T-Hangar Area (s.f.)	37,200	36,000	60,000	84,000	132,000
Total Hangar Area (s.f.)	94,200	46,200	71,500	106,200	170,000

FAA Advisory Circular 150/5300-13 suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At Buckeye Municipal Airport, the number of itinerant spaces required was determined to be approximately 17.5 percent of the busy-day itinerant operations. FAA planning criterion of 570 square yards per aircraft was applied to the number of itinerant spaces to determine future transient apron requirements. For based aircraft, apron space requirements is 300 square yards per aircraft. The results of this analysis are presented in **Table 3D.**

Currently, the airport maintains 16,700 square yards of apron space. The apron provides area for fueling, taxiing, and aircraft tie-down. As indicated in the table, additional apron will be required as itinerant aircraft use of the airport increases.

TABLE 3D
Aircraft Parking Apron Requirements
Buckeye Municipal Airport

	Existing	Current Need	Short Term	Intermediate Term	Long Range
Locally Based Aircraft Apron					
Based Aircraft Positions		3	6	5	10
Apron Area (s.y.)		900	1,800	1,500	3,000
Itinerant Ramp Requirements					
Busy Day Itinerant Operations		99	134	180	229
Itinerant Aircraft Positions		17	24	31	40
Apron Area (s.y.)		9,700	13,700	17,700	22,800
Total Positions	40	20	30	36	50
Total Apron Area (s.y.)	16,700	10,600	15,500	19,200	25,800

General Aviation Terminal Facilities

General aviation terminal facilities have several functions. Space is required for passenger waiting, pilot's lounge and flight planning, concessions, management, storage and various other needs. This space is not necessarily limited to a single, separate terminal building but also includes the space offered by fixed base operators for these functions and services.

The methodology used in estimating general aviation terminal facility needs was based upon the number of airport users expected to utilize general aviation facilities during the design hour and FAA guidelines. A planning average of 1.8 passengers per flight increasing to 2.5 passengers per flight by the end of the planning period was multiplied by the number of design hour itinerant operations to determine design hour itinerant passengers.

Space requirements were then based upon using a general planning standard of providing 60 square feet per design hour itinerant passenger. **Table 3E** outlines the general space requirements for general aviation terminal services at Buckeye Municipal Airport through the planning period.

The existing general aviation terminal building is located centrally on the ramp providing 1,200 square feet of space. The current size of the airport terminal building will not adequately accommodate the future needs as indicated below in **Table 3E**; therefore, a future terminal expansion should be planned to meet future forecast needs.

TABLE 3E
General Aviation Terminal Area
Buckeye Municipal Airport

	Existing	Current Need	Short Term	Intermediate Term	Long Range
Design Hour Itinerant Passengers		25	38	56	81
Total General Aviation Building Space (s.f.)	1,200	1,500	2,300	3,400	4,900

AVIATION SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation facilities have been identified for inclusion in this Master Plan. Facility requirements have been identified for these remaining facilities:

- Airport Access and Vehicle Parking
- Fuel Storage

AIRPORT ACCESS AND VEHICLE PARKING

Access to Buckeye Municipal Airport is available from Palo Verde Road. This two-lane roadway provides direct access to U.S. Interstate 10 approximately one mile to the north of the airport. On-airport access is provided by Butler Street which leads directly to the terminal area from Palo Verde Road. Butler Street is currently in poor condition and will need to be resurfaced in the near future. With improvement of Butler Street, the existing road system provides for adequate roadway capacity through the planning period.

Vehicle parking demands have been determined for Buckeye Municipal Airport. Space determinations were based on an evaluation of the existing airport use as well as industry standards. General aviation spaces were calculated by multiplying design hour itinerant operations by the industry standard of 1.8. Employee parking spaces typically equals 10 percent of total parking spaces on the airport. Total parking area was calculated by multiplying the total parking spaces by 315 square feet. Parking requirements are summarized in **Table 3F**.

There are currently no designated parking spaces/areas available on the airport. Approximately 20 automobile parking spaces providing approximately 6,000 square feet of space are available adjacent to businesses on the airport. While this is adequate for current use, additional parking will need to be planned if general aviation activity, especially corporate activity, increases as forecast.

TABLE 3F
General Aviation Automobile Parking Requirements
Buckeye Municipal Airport

	Existing	Short Term	Intermediate Term	Long Range
Total Parking Spaces	20	40	56	75
Auto Parking Area (s.f.)	6,000	12,600	17,600	23,600

FUEL STORAGE

The existing fuel storage at Buckeye Municipal Airport consists of a self-service fuel farm with two 10,000 gallon capacity fuel tanks. Currently, only one tank is utilized for storing 100LL Avgas.

Typically, future fuel storage requirements will consider historical fuel sales at the airport. For Buckeye Municipal Airport, however, this information is not readily available or pertinent for this analysis. Airline Training Center (ATC) had maintained a fuel storage facility for fueling of its aircraft. However, this storage facility was subsequently closed after the departure of ATC. Also, the existing fuel farm has only been operational for a few months. Therefore, analysis of future fuel requirements will consider forecast operations.

Fuel storage requirements are typically based upon maintaining a month supply of fuel during an average month. Analysis of projected operations indicates that the current fuel farm may be inadequate for the planning period. Annual operations are projected to include a higher percentage of itinerant operations in the future with an increase in operations by aircraft with higher fuel capacities. If corporate aircraft usage increases as forecast, the existing fuel storage facility may be inadequate to meet fueling demand levels on a monthly storage basis. To meet anticipated operational levels, fuel storage capacity should ultimately be increased to 20,000 gallons for both Jet A and 100LL Avgas.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Buckeye Municipal Airport for the planning horizon. A summary of the airfield and general aviation facility requirements is presented on **Exhibit 3B**.

Following the facility requirements determination, the next step is to develop a direction for development to best meet these projected needs. The remainder of the master plan will be devoted to outlining this direction, its schedule, and implementation costs.

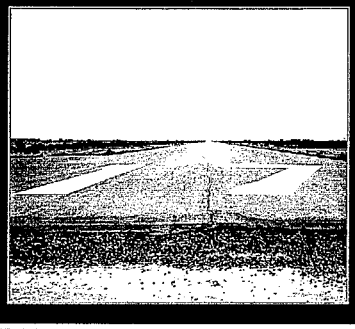
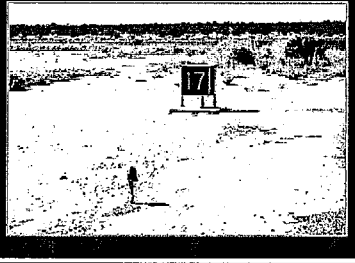
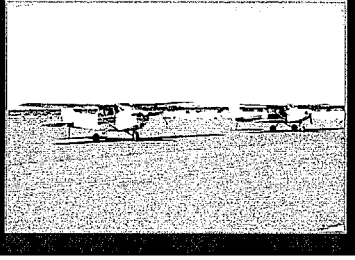
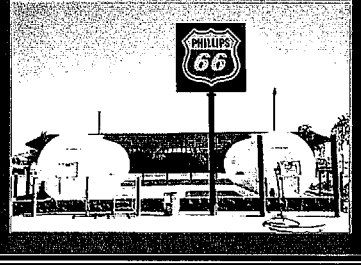
	AVAILABLE	SHORT-TERM	LONG-RANGE
RUNWAYS & TAXIWAYS . . . . . . 	**Runway 17-35** 4,300' x 75' 12,500 # SWL Full-Length Parallel Taxiway 5 Exit Taxiways	**Runway 17-35** Same	**Runway 17-35** 7,300' x 100' 75,000 # DWL Full-Length Parallel Taxiway 7 Exit Taxiways
NAVIGATIONAL AIDS & LIGHTING . . 	Airport Beacon Wind Cone Segmented Circle **Runway 17-35** MIRL, MITL PAPI-2	Airport Beacon Wind Cone Segmented Circle **Runway 17-35** MIRL, MITL GPS, REIL	Airport Beacon Wind Cone Segmented Circle **Runway 17-35** MIRL, MITL VGSI-4, MALSR CAT I GPS
AIRCRAFT STORAGE & TIEDOWN . . . . . . 	**T-Hangar Positions** 40 **Conventional Hangar Positions** 10 **Paved Tiedown Positions** 40	**T-Hangar Positions** 50 **Conventional Hangar Positions** 4 **Paved Tiedown Positions** 30	**T-Hangar Positions** 110 **Conventional Hangar Positions** 10 **Paved Tiedown Positions** 50
TERMINAL SERVICES . . . . . . 	**Terminal Building Space** General Aviation (s.f.) 1,200 **Automobile Parking** Spaces: 20 **Fuel Storage** Jet A N/A Avgas 10,000 gal.	**Terminal Building Space** General Aviation (s.f.) 2,300 **Automobile Parking** Spaces: 40 **Fuel Storage** Same	**Terminal Building Space** General Aviation (s.f.) 4,900 **Automobile Parking** Spaces: 75 **Fuel Storage** Jet A 20,000 gal. Avgas 20,000 gal.

Exhibit 3B
FACILITY REQUIREMENTS